

What is claimed is:

1. A heat exchanger comprising:
 - (a) an outer tube having an outer surface;
 - 5 (b) an inner tube received inside the outer tube and concentric therewith, wherein an axial fluid flow passageway is formed between the inner and outer tubes;
 - (c) a first inlet and a first outlet in fluid communication with the axial passageway, the first inlet and the first outlet being axially spaced from one another;
 - 10 (d) at least one circumferential fluid flow passageway being formed along the outer surface of the outer tube; and
 - (e) a corrugated strip fin being arranged in each of said at least one circumferential fluid flow passageways, each of said strip fins comprising a plurality of rows of corrugations, the corrugations each comprising a top portion, a bottom
 - 15 portion and a side wall connecting the top and bottom portions, the bottom portions of at least some of the corrugations being in contact with the outer tube.
2. The heat exchanger of claim 1, wherein each of said strip fins extends between a second inlet and a second outlet of the heat exchanger.
- 20 3. The heat exchanger of claim 1, further comprising:
 - (f) a housing comprising a sidewall having an inner surface, the sidewall surrounding the outer tube with an annular space being formed between the inner surface of the sidewall and the outer surface of the outer tube, the housing further
 - 25 comprising a second inlet and a second outlet extending through the sidewall, the second inlet and the second outlet being circumferentially spaced from one another; wherein the at least one circumferential fluid flow passageway is provided in the annular space between the housing and the outer tube, the at least one circumferential fluid flow passageway extending between the second inlet and the
 - 30 second outlet; and wherein the corrugated strip fin of each circumferential fluid flow passageway extends between the second inlet and the second outlet.

4. The heat exchanger of claim 1, wherein the corrugated strip fins are arranged in the circumferential fluid flow passageways in a low pressure drop orientation with rows of corrugations in the corrugated strip fins extending axially through the circumferential flow passageways and with apertures through the corrugations
5 extending circumferentially.

5. The heat exchanger of claim 2, wherein the corrugated strip fins are arranged in the circumferential fluid flow passageways in a low pressure drop orientation with rows of corrugations in the corrugated strip fins extending axially through the
10 circumferential flow passageways and with apertures through the corrugations extending circumferentially; and wherein each of the corrugated strip fins has a pair of circumferentially spaced edges, one of the edges being located at the second inlet and one of the edges being located at the second outlet; and wherein the apertures of the corrugations along each of the edges are completely open to either
15 the second inlet or the second outlet.

6. The heat exchanger of claim 2, wherein the outer surface of the outer tube is in direct communication with the second inlet and the second outlet.

20 7. The heat exchanger of claim 2, wherein the second inlet and the second outlet are circumferentially spaced from one another by about 180 degrees, so as to form first and second circumferential flow passageways between the inlet and the outlet, the first and second flow passageways diverging from the inlet, extending around opposite sides of the outer tube, and converging at the outlet.

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8. The heat exchanger of claim 7, wherein the first and second flow passageways are each provided with one of said corrugated strip fins, each of the strip fins having a pair of circumferentially spaced edges, one of the edges being located at the second inlet and one of the edges being located at the second outlet;
30 wherein the edges of one strip fin are circumferentially spaced from the edges of the other strip fin so as to form gaps between the strip fins at the second inlet and the second outlet, the outer tube being in direct communication with the second inlet and the second outlet at said gaps.

9. The heat exchanger of claim 8, wherein the gaps extend axially along at least part of the length of the outer tube.
- 5 10. The heat exchanger of claim 3, wherein the top portions of at least some of the corrugations are in contact with the inner surface of the housing.
11. The heat exchanger of claim 1, including at least one radially inner circumferential flow passageway having an inner strip fin and at least one radially
10 outer circumferential flow passageway having an outer strip fin, the inner and outer strip fins being in thermal contact with one another.
12. The heat exchanger of claim 11, wherein flow communication is provided between the inner and outer flow passageways.
- 15 13. The heat exchanger of claim 12, wherein flow communication between the inner and outer flow passageways is provided by a layer of thermally conductive, perforated sheet material.
- 20 14. The heat exchanger of claim 13, wherein the thermally conductive sheet material comprises a layer of perforated sheet metal which is in contact with the bottom portions of at least some of the corrugations of the outer strip fin and with the top portions of at least some of the corrugations of the inner strip fin.
- 25 15. The heat exchanger of claim 14, wherein an area of the sheet metal is substantially coextensive with the inner and outer strip fins.
16. The heat exchanger of claim 1, wherein the corrugated strip fins are arranged in the circumferential fluid flow passageways in a high pressure drop orientation with
30 rows of corrugations in the corrugated strip fins extending circumferentially through the circumferential flow passageways and with apertures through the corrugations extending axially.

17. The heat exchanger of claim 1, wherein an interior of the inner tube is partially blocked, thereby limiting fluid flow through the inner tube.

18. The heat exchanger of claim 17, wherein the inner tube is partially blocked by
5 a metering cap provided at an end of the inner tube, the metering cap having at least one aperture to permit flow of fluid through the inner tube.

19. The heat exchanger of claim 2, wherein the second inlet and the second outlet are axially spaced from one another.

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20. The heat exchanger of claim 1, further comprising flow guides to direct fluid flow through the circumferential fluid flow passageways.

21. The heat exchanger of claim 20, wherein the flow guides are selected from
15 the group consisting of radially-extending baffle plates and crimps or other deformations in the strip fins which restrict axial fluid flow.

22. The heat exchanger of claim 3, wherein an interior of the inner tube is for flow of a first fluid, the axial fluid flow passageway is for flow of a second fluid and the at
20 least one circumferential fluid flow passageway is for flow of a third fluid, the heat exchanger further comprising a third inlet and a third outlet through which the first fluid enters and leaves the heat exchanger.

23. The heat exchanger of claim 22, wherein the first inlet and the third inlet are
25 formed on an inlet fitting attached to an end of the housing, the first outlet and the third outlet are provided on an outlet fitting attached to an opposite end of the housing, and the second inlet and the second outlet are provided on the housing.

24. The heat exchanger of claim 3, wherein the axial fluid flow passageway is for
30 flow of a liquid coolant and wherein the housing is provided with at least one coolant channel for flow of the liquid coolant.

25. The heat exchanger of claim 24, wherein the first inlet and the first outlet are provided in respective inlet and outlet fittings attached to opposite ends of the housing, wherein the at least one cooling channel extends axially between the opposite ends of the housing, and wherein the inlet fitting includes at least one side
5 channel, each of which is in communication with the first inlet and with an end of one of the cooling channels of the housing.

26. The heat exchanger of claim 25, wherein the side channels extend radially outwardly from the inlet to the cooling channels of the housing.

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27. A core for a heat exchanger, the core comprising:

- (a) an outer tube having an outer surface;
- (b) an inner tube received inside the outer tube and concentric therewith, wherein an axial fluid flow passageway is formed between the inner and outer
15 tubes;
- (c) a first inlet and a first outlet in fluid communication with the axial passageway, the first inlet and the first outlet being axially spaced from one another;
- (d) at least one circumferential fluid flow passageway being formed along the outer surface of the outer tube; and
- 20 (e) a corrugated strip fin being arranged in each of said at least one circumferential fluid flow passageways, each of said strip fins comprising a plurality of rows of corrugations, the corrugations each comprising a top portion, a bottom portion and a side wall connecting the top and bottom portions, the bottom portions of at least some of the corrugations being in contact with the outer tube.

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